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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/578,460	02/22/2007	Darren James Ellis	2713-1-043PCT/US	2111

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EXAMINER	
RILEY, JEZIA	

ART UNIT	PAPER NUMBER
1637	

MAIL DATE	DELIVERY MODE
12/16/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/578,460	ELLIS ET AL.	
	Examiner	Art Unit	
	Jezia Riley	1637	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 October 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,4-38 and 40* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,4-9,11,12,15-38 and 40* is/are rejected.

7)☒ Claim(s) *10,13 and 14* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *10/20/08*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Remarks

Applicants' arguments, filed on 10/10/08, have been approved and entered. They have been fully considered. Rejections and/or objections not reiterated from previous office actions are hereby withdrawn. The following rejections and/or objections are either newly applied or reiterated. They constitute the complete set presently being applied to the instant application.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-2, 4-9, 15, 18-20, 23-34, 37, 38, 40 are rejected under 35 U.S.C. 102(b) as being anticipated by Zhao et al. (Nucleic Acids Research, 2001, Vol. 29, No.4, 955-959).

Zhao et al. discloses immobilization of hairpin oilgonucleotides with multiple anchors to microchips. They demonstrate that an oligonucleotide modified with multiple phosphorothiates in its backbone can undergo efficient anchorage to a glass surface comprising a silane moiety with bromacetamide functionality (pages 956-957). Said hairpin oligonucleotides are used in hybridization assay, which is viewed to be inclusive

of instant claim 15. Figure 2 shows arrayed primed extension on a glass slide, comprising double stranded region and a loop with non hybridized nucleotides.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-2, 4-9, 11-12, 15-38, 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Balasubramanian PGPUB-NUMBER: 20030022207 in view of Zhao et al. (Nucleic Acids Research, 2001, Vol. 29, No.4, 955-959).

Balasubramanian et al. discloses Arrayed polynucleotides and their use in genome analysis. Immobilisation can be by specific covalent or non-covalent

interactions. Covalent attachment is preferred. Immobilisation can be at an internal position or at either the 5' or 3' position. However, the polynucleotide can be attached to the solid support at any position along its length, the attachment acting to tether the polynucleotide to the solid support. The immobilised polynucleotide is then able to undergo interactions at positions distant from the solid support. Typically the interaction will be such that it is possible to remove any molecules bound to the solid support through non-specific interactions, e.g. by washing. Immobilisation in this manner results in well separated single polynucleotides.

In one embodiment, the array comprises polynucleotides with a hairpin loop structure, one end of which comprises the target polynucleotide derived from the genomic DNA sample.

The stem comprises the hybridised polynucleotides and the loop is the region that covalently links the two complementary polynucleotides. Anything from a 5 to 25 (or more) base pair double-stranded (duplex) region can be used to form the stem. In one embodiment, the structure can be formed from a single-stranded polynucleotide having complementary regions. The loop in this embodiment can be anything from 2 or more non-hybridised nucleotides. In a second embodiment, the structure is formed from two separate polynucleotides with complementary regions, the two polynucleotides being linked (and the loop being at least partially formed) by a linker moiety. The linker moiety forms a covalent attachment between the ends of the two polynucleotides. Linker moieties suitable for use in this embodiment will be apparent to the skilled person. For example, the linker moiety can be polyethylene glycol (PEG).

There are many different ways of forming the hairpin structure to incorporate the target polynucleotide. However, a preferred method is to form a first molecule capable of forming a hairpin structure, and ligate the target polynucleotide to this. Ligation can be carried out either prior to or after immobilisation to the solid support. The resulting structure comprises the target polynucleotide at one end of the hairpin and a primer polynucleotide at the other end. The target polynucleotide can be either single stranded or double stranded as long as the 3'-end of the hairpin contains a free hydroxyl amenable to further polymerase extension.

The DNA to be analyzed can be PCR-amplified or used directly to generate fragments of DNA using either restriction endonucleases, other suitable enzymes, a mechanical form of fragmentation or a non-enzymatic chemical fragmentation method or a combination thereof. The DNA can be genomic DNA. The fragments can be of any suitable length, preferably from 20 to 2000 bases, more preferably 20 to 1000 bases, most preferably 20 to 200 bases. In the case of fragments generated by restriction endonucleases, hairpin structures bearing a complementary restriction site at the end of the first hairpin can be used. In the case of non-selective fragmentation, ligation of one strand of the DNA sample fragments can be achieved by various methods. ([0051]-[0055]).

Zhao et al. discloses immobilization of hairpin oilgonucleotides with multiple anchors to microchips. They demonstrate that an oligonucleotide modified with multiple phosphorothiates in its backbone can undergo efficient anchorage to a glass surface

comprising a silane moiety with a bromacetamide functionality (pages 956-957). Said hairpin oligonucleotides are used in hybridization assay, which is viewed to be inclusive of instant claim 15. Figure 2 shows arrayed primed extension on a glass slide, comprising double stranded region and a loop with non hybridized nucleotides.

Therefore it would have been obvious at the time the invention was made to one of ordinary skill in the art to attached the hairpin of Balasubramanian to a solid surface via sulfur-based as taught by Zhao. The motivation is that the covalent attachment of oligonucleotides to the surface glass slides has the advantage of conferring substantial resistance to washing in pursuit of background reduction. Attachment as shown by Zhao using phosphorothioate and bromoacetamidosilane, do not form dimers via formation of an intermolecular S-S bond and function as nucleophiles without reduction. (Zhao, page 956, col. 2). Zhao shows that the attachment method provides an efficient way to immobilize oligonucleotides though covalent bonds at a desirable density and orientation. (Zhao page 958, col.2).

Claims 10, 13, 14 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Applicants' Amendments:

Applicants argue the references fail to teach or suggest the instant invention because none of them teach attachment of the hairpin to a solid support via a linker and that the thiophosphate moiety is positioned on the end of the linker.

This is not convincing because in instant claim 1 for example, it is claiming that the sulfur-based nucleophile can be attached via a bond to the solid support. There are also no limitations showing that the thiophosphate moiety is positioned on the end of the linker. Therefore the rejection is maintained.

THIS ACTION IS MADE FINAL. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for response to this final action is set to expire THREE MONTHS from the date of this action. In the event a first response is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event will the statutory period for response expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jezia Riley whose telephone number is 571-272-0786. The examiner can normally be reached on 9:30AM - 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gary Benzion can be reached on 571-272-0782. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

12/12/2008

/Jezia Riley/
Primary Examiner, Art Unit 1637